Influence of straw and inorganic fertilizer on soil microbial activities and grain yield of rice (BG 94-1) grown in Low Country Intermediate Zone of Sri Lanka

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A field investigation was carried out to examine the influence of different combinations of rice straw and inorganic fertilizer on soil microbial activities and grain yield of flooded direct seeded rice in the Low Country Intermediate Zone of Sri Lanka. Six treatments of different combinations of 2 straw levels with 3 levels of inorganic fertilizers were included to determine interaction effects. Zero control (C) had no fertilizer additions, while the standard control (F) was the recommended ferilizer practice. Together with straw the inorganic fertilizer levels were reduced for N fertilizer and it was 0 level of K. The experiment (according to RCBD with Nested treatment arrangement) was conducted for eight consecutive seasons starting from Maha 1996/ 97. Season X treatment interaction on grain yield was significant (p=0.05). Recommended inorganic fertilizer practice (F) increased yield 42.7% over zero control (mean for 8 seasons). 2 t of straw/ ha + reduced fertilizer (2S) and 3 t of straw/ ha + reduced fertilizer (3S) showed yield increase of 17.5 % and 23.9 % respectively over the zero control (C), and 6.6 % and 14.3% respectively over F. 2S and 3S gave yield increase by Season X treatment interaction on soil microbial activities (amount of CO_2) was found to be significant (p=0.05). The increase of CO_2 released by 2S and 3S treatments over F were 85% and 103% respectively. 2S and 3S showed 43.6% and 66.8% increase in CO_2 release over that of F.

Always straw with inorganic fertilizer showed a statistically significant (p=0.05) yield increase than straw alone or inorganic fertilizer alone. Straw together with reduced amounts of inorganic fertilizers had high microbial activites as expected because a C-energy source (ie. straw) was available together with easily available inorganic N source. The increased soil microbial activities contributed to soil biology improvement, and the total effect of straw incorporation with the improved soil biology has contributed to the grain yield increase. The significant season X treatment interaction on the grain yield confirmed that the cultivation season has a major influence on the effect of straw incorporation technology on the grain yield increase. This investigation confirmed that 2 t of straw from the previuos crop of the same field, together with reduced quantity of N fertilizer with complete cutdown of K synthetic fertilizer was an efficient way of using straw technology to achieve high yield together with a cutdown of input cost in direct seeded rice cultivation in an environment friendly manner.

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